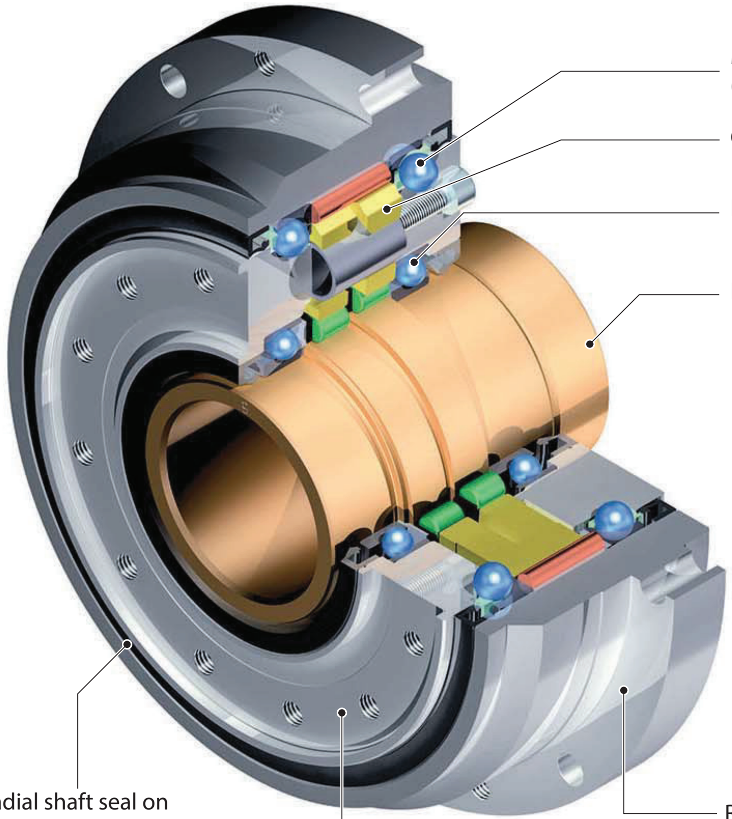
7 C-Series

F4C(F)-C
F2CF-C



Special feature:
The large diameter of the hollow shaft allows effective use of space for cables or pipelines

- 6 sizes
- Reduction ratios (single stage) 29/59/89/119
- Nominal output torques up to 4328 Nm
- Acceleration torques up to 6278 Nm
- Hollow shaft diameter from 40 to 99 mm
- Completely sealed and maintenance-free
- Lost Motion < 1

7.1 Torques according to output speeds

Input speed n_{1m} [min^{-1}]			5			10			15			20		
Model	Size	Reduction ratio i	Nominal output torque [Nm]	Output speed [min^{-1}]	Max. permissible input power [kW]	Nominal output torque [Nm]	Output speed [min^{-1}]	Max. permissible input power [kW]	Nominal output torque [Nm]	Output speed [min^{-1}]	Max. permissible input power [kW]	Nominal output torque [Nm]	Output speed [min^{-1}]	Max. permissible input power [kW]
F4CF-	C15	29	276	145	0.19	276	290	0.39	276	435	0.58	276	580	0.77
		59	296	295	0.21	296	590	0.41	263	885	0.55	242	1180	0.67
		89	296	445	0.21	263	890	0.37	233	1335	0.49	214	1780	0.6
		119	296	595	0.21	241	1190	0.34	213	1785	0.45	196	2380	0.55
F4C-	C25	59	568	295	0.4	568	590	0.79	505	885	1.06	464	1180	1.29
		89	568	445	0.4	505	890	0.7	447	1335	0.94	410	1780	1.14
		119	568	595	0.4	463	1190	0.65	410	1785	0.86	376	2380	1.05
F4CF-	C35	59	1082	295	0.76	1082	590	1.51	963	885	2.02	883	1180	2.47
		89	1082	445	0.76	961	890	1.34	851	1335	1.78	781	1780	2.18
		119	1082	595	0.76	881	1190	1.23	780	1785	1.63	716	2380	2
F2CF-	C45	59	1758	295	1.23	1758	590	2.45	1565	885	3.28	1435	1180	4.01
		89	1758	445	1.23	1562	890	2.18	1383	1335	2.90	1269	1780	3.54
		119	1758	595	1.23	1432	1190	2	1268	1785	2.65			
	C55	59	2705	295	1.89	2705	590	3.78	2407	885	5.04	2208	1180	6.17
		89	2705	445	1.89	2403	890	3.36	2128	1335	4.46			
		119	2705	595	1.89	2203	1190	3.08						
	C65	59	4328	295	3.02	4328	590	6.04	3852	885	8.07	3533	1180	9.87
		89	4328	445	3.02	3845	890	5.37	3405	1335	7.13			
		119	4328	595	3.02	3524	1190	4.92						

Table C-1 Rating values (reference value input speed n_{1m})

Size	Max. acceleration and deceleration torque T_{2A}	Peak torque for emergency stop T_{2max}
	[Nm]	[Nm]
C15	540	1080
C25	1030	2060
C35	1962	3924
C45	3188	6377
C55	4316	8633
C65	6278	12577

Table C-2 Maximum acceleration or deceleration torque

25			30			Max. permissible input speed $n_{1\,max}$ short term [min^{-1}]	Max. permissible input speed $n_{1\,ED}$ [min^{-1}]		Moment of inertia j related to the input shaft [$\times 10^{-4}$ kgm^2]	Mass [kg]
Nominal output torque [Nm]	Output speed [min^{-1}]	Max. permissible input power [kW]	Nominal output torque [Nm]	Output speed [min^{-1}]	Max. permissible input power [kW]		50% ED	100% ED		
261	725	0.91	247	870	1.03	3350	2400	1200	3.52	
226	1475	0.79	214	1770	0.9				3.51	6
200	2225	0.7	189	2670	0.79	4000	3200	1600	3.5	
183	2975	0.64							3.49	
434	1475	1.51	411	1770	1.72				8.2	
383	2225	1.34	363	2670	1.52	3500	2900	1450	8.2	12.5
									8.2	
826	1475	2.88	782	1770	3.28				32.8	
						2500	2100	1050	32.7	21
									32.7	
1342	1475	4.69	1271	1770	5.32				69.6	
						2100	1800	900	69.4	32
									69.3	
2065	1475	7.21							129.4	
						1800	1500	750	129.0	45
									128.8	
									223.6	
						1700	1400	700	222.9	62
									222.6	

: 50% ED-range   : 100% ED-range

1. T_{2N} = nominal output torque
   Nominal output torque corresponds to the max. permissible average load torque at all output speeds.
   The nominal output torque for speeds less than 5 min^{-1} is equal to the value at 5 min^{-1}.
   The value for the maximum permissible input power is calculated from the nominal output torque at 100%.
   This value takes the efficiency of Fine Cyclo into consideration.
2. n_{1max} = maximum permissible input speed
   However, it must be n_{1m} (mean input speed) < $n_{1\,ED}$.
3. $n_{1\,ED}$ = permissible input speed according to load duty cycles
4. T_{2A} = max. acceleration and braking torque (for fatigue strength at $2 \cdot 10^7$ load cycles)
   Permissible peak torque for normal start and stop procedures.
5. T_{2max} = max. permissible torque for emergency stop situations or in the event of heavy shocks (limited by the mechanical strength) (permissible 1000 times during the entire lifetime).
6. The nominal torque T_{2N} is calculated using the following equation when the speed is not shown in the table above:

$$T_{2N} = T_{2N.\,5}\left(\frac{5}{n_{2m}}\right)^{0.3}$$

T_{2N} : Nominal torque at output speed n_{2m}
$T_{2N.\,5}$: Nominal torque at output speed n_{2m} is 5 min^{-1}

7.2 Torques according to input speeds

Input speed n_{1m} [min^{-1}]			2500			2000			1750			1500		
Model	**Size**	**Reduction ratio i**	**Nominal output torque [Nm]**	**Output speed [min^{-1}]**	**Max. permissible input power [kW]**	**Nominal output torque [Nm]**	**Output speed [min^{-1}]**	**Max. permissible input power [kW]**	**Nominal output torque [Nm]**	**Output speed [min^{-1}]**	**Max. permissible input power [kW]**	**Nominal output torque [Nm]**	**Output speed [min^{-1}]**	**Max. permissible input power [kW]**
F4CF-	**C15**	**29**	180	86.2	2.17	192	69	1.85	200	60.3	1.69	210	51.7	1.51
		59	193	42.4	1.14	206	33.9	0.98	215	29.7	0.89	225	25.4	0.8
		89	193	28.1	0.76	206	22.5	0.65	215	19.7	0.59	225	16.9	0.53
		119	193	21	0.57	206	16.8	0.48	215	14.7	0.44	225	12.6	0.4
F4C-	**C25**	**59**	370	42.4	2.19	396	33.9	1.87	412	29.7	1.7	432	25.4	1.53
		89	370	28.1	1.45	396	22.5	1.24	412	19.7	1.13	432	16.9	1.01
		119	370	21	1.08	396	16.8	0.93	412	14.7	0.84	432	12.6	0.76
F4CF-	**C35**	**59**				754	33.9	3.56	785	29.7	3.24	822	25.4	2.91
		89				754	22.5	2.36	785	19.7	2.15	822	16.9	1.93
		119				754	16.8	1.77	785	14.7	1.61	822	12.6	1.44
F2CF-	**C45**	**59**							1275	29.7	5.27	1336	25.4	4.73
		89							1275	19.7	3.5	1336	16.9	3.14
		119							1275	14.7	2.61	1336	12.6	2.35
	C55	**59**										2055	25.4	7.28
		89										2055	16.9	4.83
		119										2055	12.6	3.61
	C65	**59**												
		89												
		119												

Table C-3 Rating values (reference value input speed n_{1m})

Size	**Max. acceleration and deceleration torque T_{2A}**	**Peak torque for emergency stop T_{2max}**
	[Nm]	**[Nm]**
C15	540	1080
C25	1030	2060
C35	1962	3924
C45	3188	6377
C55	4316	8633
C65	6278	12577

Table C-4 Maximum acceleration or deceleration torque

1000			750			< 600			Max. permissible input speed $n_{1\,max}$ short term [min^{-1}]	Max. permissible input speed $n_{1\,ED}$ [min^{-1}]		Moment of inertia j related to the input shaft [$\times 10^{-4}$ kgm^2]	Mass [kg]
Nominal output torque [Nm]	Output speed [min^{-1}]	Max. permissible input power [kW]	Nominal output torque [Nm]	Output speed [min^{-1}]	Max. permissible input power [kW]	Nominal output torque [Nm]	Output speed [min^{-1}]	Max. permissible input power [kW]		50% ED	100% ED		
237	34.5	1.14	258	25.9	0.93	276	21	0.8	3350	2400	1200	3.52	
254	16.9	0.6	277	12.7	0.49	296	10	0.42				3.51	6
254	11.2	0.4	277	8.4	0.33	296	7	0.28	4000	3200	1600	3.5	
254	8.4	0.3	277	6.3	0.24	296	5	0.21				3.49	
487	16.9	1.15	531	12.7	0.94	568	10.2	0.81				8.3	
487	11.2	0.76	531	8.4	0.62	568	6.7	0.53	3500	2900	1450	8.2	12.5
487	8.4	0.57	531	6.3	0.47	568	5	0.4				8.2	
928	16.9	2.19	1012	12.7	1.79	1082	10.2	1.53				32.8	
928	11.2	1.45	1012	8.4	1.19	1082	6.7	1.02	2500	2100	1050	32.7	21
928	8.4	1.09	1012	6.3	0.89	1082	5	0.76				32.7	
1508	16.9	3.56	1644	12.7	2.91	1758	10.2	2.49				69.6	
1508	11.2	2.36	1644	8.4	1.93	1758	6.7	1.65	2100	1800	900	69.4	32
1508	8.4	1.77	1644	6.3	1.44	1758	5	1.24				69.3	
2321	16.9	5.48	2530	12.7	4.48	2705	10.2	3.83				129.4	
2321	11.2	3.63	2530	8.4	2.97	2705	6.7	2.54	1800	1500	750	129.0	45
2321	8.4	2.72	2530	6.3	2.22	2705	5	1.9				128.8	
3713	16.9	8.77	4048	12.7	7.17	4328	10.2	6.14				223.6	
3713	11.2	5.82	4048	8.4	4.75	4328	6.7	4.07	1700	1400	700	222.9	62
3713	8.4	4.35	4048	6.3	3.56	4328	5	3.04				222.6	

: 50% ED-range   : 100% ED-range

1. T_{2N} = nominal output torque
   Nominal output torque corresponds to the max. permissible average load torque at all input speeds.
   The nominal output torque for speeds less than 600 min^{-1} is equal to the value at 600 min^{-1}.
   The value for the maximum permissible input power is calculated from the nominal output torque at 100%.
   This value takes the efficiency of Fine Cyclo into consideration.
2. n_{1max} = maximum permissible input speed
   However, it must be n_{1m} (mean input speed) < $n_{1\,ED}$.
3. $n_{1\,ED}$ = permissible input speed according to load duty cycles
4. T_{2A} = max. acceleration and braking torque (for fatigue strength at $2 \cdot 10^7$ load cycles)
   Permissible peak torque for normal start and stop procedures.
5. T_{2max} = max. permissible torque for emergency stop situations or in the event of heavy shocks (limited by the mechanical strength) (permissible 1000 times during the entire lifetime).
6. The nominal torque T_{2N} is calculated using the following equation when the speed is not shown in the table above:

$$T_{2N} = T_{2N.\,600} \left(\frac{600}{n_{1m}} \right)^{0.3}$$

T_{2N} : Rated torque at input speed n_{1m}
$T_{2N.\,600}$: Rated torque at input speed n_{1m} is 600 min^{-1}

7.3 Rigidity and Lost Motion

Size	i	Test torque T_p [Nm]	Lost Motion		Torsional stiffness 3% - 50% T_p [Nm/arcmin]	Torsional stiffness 3% - 100% T_p [Nm/arcmin]	Torsional stiffness 50% - 100% T_p [Nm/arcmin]
			Lost Motion [arcmin]	Domain of definition [Nm]			
C15	29	±215	< 1	±6.5	40	69	77
	59						
	89						
	119						
C25	59	±412		±12.4	71	115	128
	89						
	119						
C35	59	±785		±23.5	200	259	294
	89						
	119						
C45	59	±1275		±38.3	353	404	491
	89						
	119						
C55	59	±1962		±58.9	588	635	687
	89						
	119						
C65	59	±3139		±94.2	765	918	1030
	89						
	119						

Table C-5 Torsional stiffness

T_p: Test torque at input speed n_1 = 1750 min^{-1}

Calculation of the twist angle:

1) At a load torque less than 3% T_p

$$\varphi = \frac{\text{Lost Motion}}{2} \cdot \frac{\text{Load torque}}{0.03 \cdot T_p}$$

2) At a load torque greater than 3% T_p (standard case)

$$\varphi = \frac{\text{Lost Motion}}{2} + \frac{\text{Load torque} - (0.03 \cdot T_p)}{\text{Torsional stiffness}}$$

Note arcmin means "angular minute".
Table values for rigidity are average values.

7.4 No-load running torque NLRT

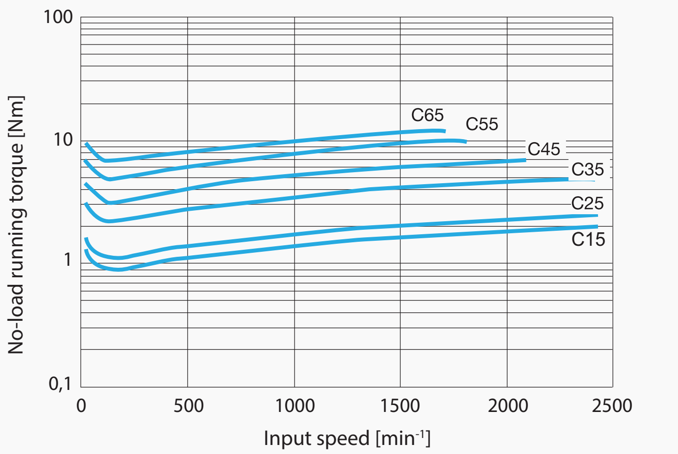


Fig. C-1 Input side no-load running torque

Note
1. Fig. C-1 shows the average no-load running torque after gearbox is run in (not factory-new condition).
2. Table C-6 shows the measuring conditions

Ring gear housing temperature	approx. 30 °C
Precision during assembly	as per 7.8.1
Lubrication	Standard lubrication

Table C-6 Measurement conditions

7.5 Breakaway torque

Indicates the necessary torque for breakaway of the gearbox on the input or output side, after stop without output side load.

Breakaway torque on output side (BTO)

Note
1. Table C-8 shows the max. breakaway torque on the output side BTO. Fine Cyclo reducers are not self-locking. The BTO is defined as the maximum value (factory-new condition), which steadily decreases during the lifetime.
2. Table C-7 shows the measuring conditions

Precision during assembly	as per 7.8.1
Lubrication	Standard lubrication

Table C-7 Measurement conditions

Size	i	Breakaway torque BTO [Nm]
C15	29	< 70
	59	< 70
	89	< 128
	119	< 128
C25	59	< 200
	89	< 220
	119	< 240
C35	59	< 300
	89	< 415
	119	< 550
C45	59	< 340
	89	< 550
	119	< 715
C55	59	< 600
	89	< 810
	119	< 1000
C65	59	< 700
	89	< 1000
	119	< 2100

Table C-8 Value of the breakaway torque on the output side (BTO)

Breakaway torque on input side (BTI)

Note
1. Table C-9 shows the max. breakaway torque BTI on the input side. The BTI is defined as the maximum value (factory-new condition) which steadily decreases during the lifetime.
2. Table C-7 shows the measuring conditions

Size	Breakaway torque BTI [Nm]
C15	< 2.4
C25	< 3.5
C35	< 4.5
C45	< 6.5
C55	< 9.0
C65	< 11.5

Table C-9 Value of the breakaway torque on the input side (BTI)

7.6 Efficiency

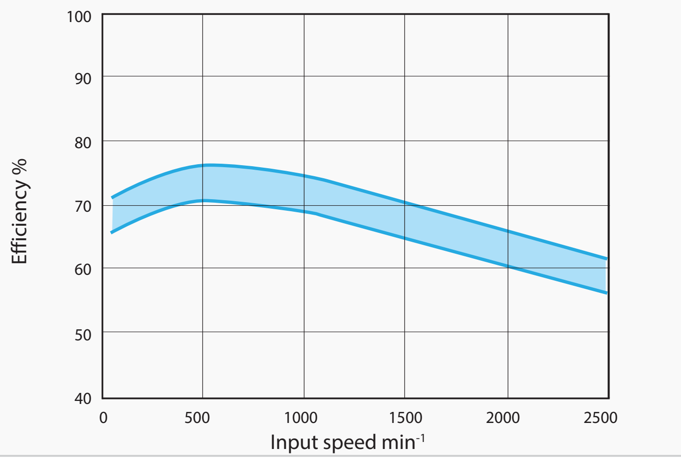


Fig. C-2 a Efficiency curve (size C15-C45)

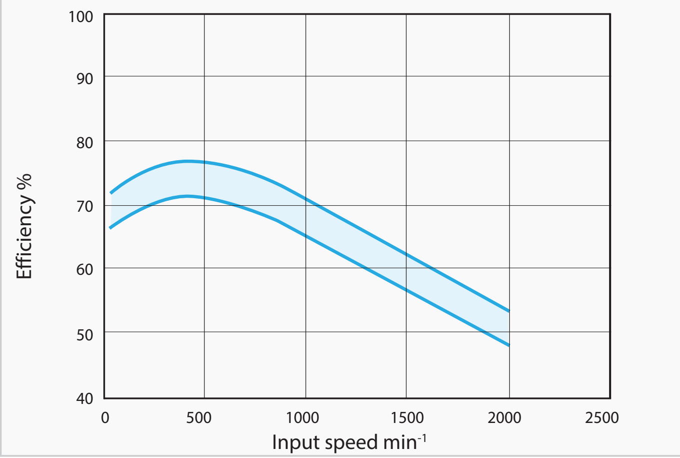


Fig. C-2b Efficiency curve (size C55-C65)

Fig. C-2a and Fig. C-2b show the correlation between efficiency and input speed Further information see "4 Explaining the technical details" on page 18.

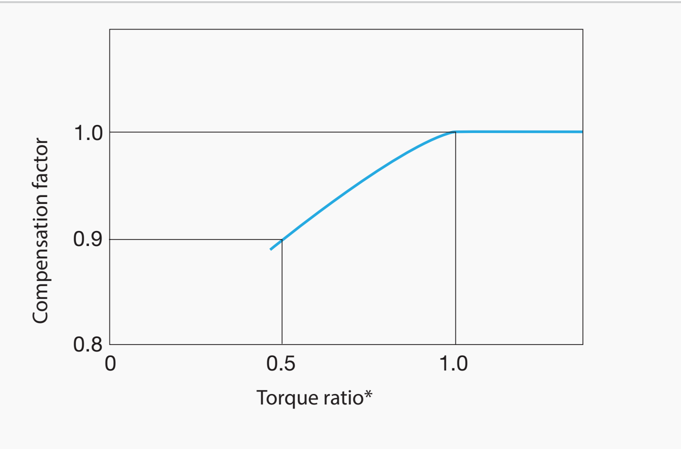


Fig. C-3 Compensation curve for efficiency

$$\text{* Torque ratio} = \frac{\text{Load torque}}{\text{Nominal output torque}}$$

Compensation efficiency = efficiency · compensation factor

Note

1. The efficiency changes if the load torque does not match the nominal torque. Check the compensation factor in the diagram Fig. C-3.
2. When the torque ratio is over 1.0, the compensation factor for efficiency is 1.0 (Diagram Fig. C-3).

7.7 Bearing loads

7.7.1 Maximum permissible radial and axial load on the input shaft

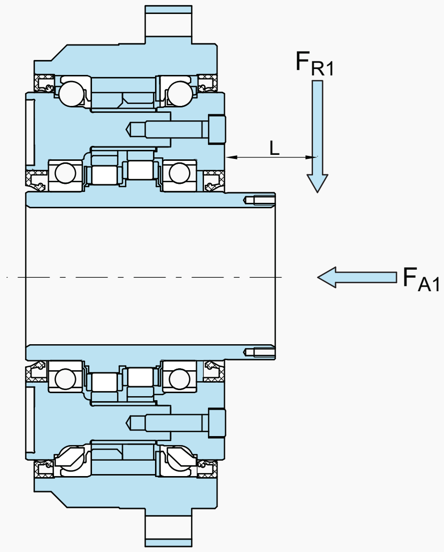


Fig. C-4 Load position on input shaft

Load factor input L_{f1}						
L	Size					
[mm]	C15	C25	C35	C45	C55	C65
5	0.79	0.8	0.76	0.75	0.73	0.73
10	0.86	0.86	0.81	0.79	0.77	0.77
15	0.93	0.92	0.86	0.83	0.8	0.8
20	1	0.98	0.9	0.87	0.84	0.84
25	1.25	1.14	0.95	0.91	0.88	0.87
30	1.5	1.36	1	0.95	0.91	0.9
35	1.75	1.59	1.17	0.99	0.95	0.94
40	2	1.82	1.33	1.11	0.99	0.97
45	2.25	2.05	1.5	1.25	1.07	1.02
50	2.5	2.27	1.67	1.39	1.19	1.14
60	3	2.73	2	1.67	1.43	1.36
70				1.94	1.67	1.59
80					1.9	1.82

Table C-10 Load factor input L_{f1}
L = distance from input side carrierr

If a pinion or toothed belt pulley is mounted on the input shaft, the values for radial load and axial load should be equal to or less than the permissible values. The following equation is used to check whether the shaft load is permissible:

1. Input radial load F_{R1}

$$F_{R1} = 10^3 \cdot \frac{T_{2V}}{\eta \cdot i \cdot r_0} \leq \frac{F_{R1\,max}}{L_{f1} \cdot C_{f1} \cdot B_{f1}} \quad [N] \qquad \text{(Equation C-1)}$$

2. Input side axial load F_{A1}

$$F_{A1} \leq \frac{F_{A1\,max}}{C_{f1} \cdot B_{f1}} [N] \qquad \text{(Equation C-2)}$$

3. When radial and axial loads co-exist

$$\left(\frac{F_{R1} \cdot L_{f1}}{F_{R1\,max}} + \frac{F_{A1}}{F_{A1\,max}} \right) \cdot C_{f1} \cdot B_{f1} \leq 1 \qquad \text{(Equation C-3)}$$

F_{R1} = input side radial load [N]
T_{2V} = equivalent output torque on output shaft [Nm]
r_0 = pitch circle radius of sprocket, pinion or toothed belt pulley [mm]
$F_{R1\,max}$ = maximum permissible input side radial load [N] (Table C-11)
F_{A1} = input side axial load [N]
$F_{A1\,max}$ = maximum permissible input side axial load [N] (Table C-12)
L_{f1} = load factor input (Table C-10)
C_{f1} = correction factor input (Table C-13)
B_{f1} = service factor input (Table C-14)
L = distance of the radial load from the input side carrier (Table C-10)
η = 0.7 (efficiency)

Size	Input speed n_{1m} [min^{-1}]						
	2500	2000	1750	1500	1000	750	600
C15	384	453	491	534	655	748	825
C25	523	563	589	620	709	781	841
C35			687	723	828	911	981
C45			785	826	946	1041	1121
C55				981	1123	1236	1332
C65					1419	1561	1682

Table C-11 Max. permissible input side radial load $F_{R1\,max}$ [N]

Size	Input speed n_{1m} [min^{-1}]						
	2500	2000	1750	1500	1000	750	600
C15	432	479	509	546	658	751	832
C25	540	589	628	677	824	942	1040
C35		746	795	863	1040	1197	1334
C45			912	981	1197	1373	1530
C55				1481	1785	2050	2276
C65					2570	2953	3286

Table C-12 Max. permissible input side axial load $F_{A1\,max}$ [N]

Calculation of the max. permissible radial load on the input shaft

Calculation of the max. permissible radial load using the following equation when the speed is not shown in the table above.

$$F_{R1\,max} = F_{R1.600}\left(\frac{600}{n_{1m}}\right)^{1/3}$$

$F_{R1\,max}$ = maximum permissible input side radial load at input speed n_{1m}

$F_{R1.600}$ = input side radial load at input speed n_{1m} = 600 min^{-1}

Calculation of the max. permissible axial load on the input shaft

Calculation of the max. permissible axial load using the following equation when the speed is not shown in the table above.

$$F_{A1\,max} = F_{A1.600}\left(\frac{600}{n_{1m}}\right)^{0.47}$$

$F_{A1\,max}$ = maximum permissible input side axial load at input speed n_{1m}

$F_{A1.600}$ = input side axial load at input speed n_{1m} = 600 min^{-1}

Correction factor input	C_{f1}
Chain	1
Pinion*	1.25
Toothed belt	1.25
V-Belt	1.5

Table C-13 Correction factor input C_{f1}

* For helical pinions or bevel gears, please consult Sumitomo Drive Technologies.

Service factor input	B_{f1}
Uniform load	1
Light impacts	1.2
Severe impacts	1.6

Table C-14 Service factor input B_{f1}

7.7.2 Main bearings

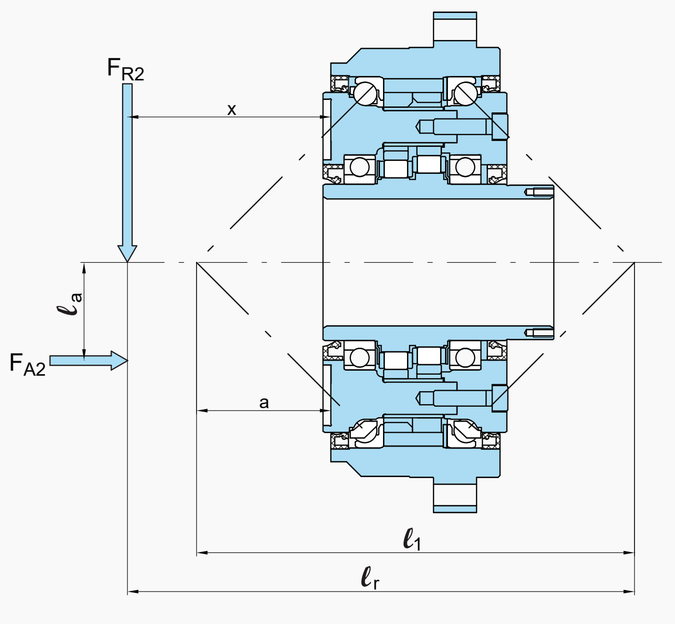


Fig. C-5 Distance between the individual loading points

$$\ell_r = x - a + \ell_1 \quad \text{(Equation C-4)}$$

Size	Values of internal bearing distance	
	ℓ_1 [mm]	a [mm]
C15	130.6	33.2
C25	162	43.3
C35	196.2	54.9
C45	158.8	30.9
C55	191.8	41.9
C65	211.8	46.4

Table C-15 Bearing clearances [mm]

Note If: $\ell_r > 4 \cdot \ell_1$, please contact Sumitomo Drive Technologies.

1. Moment stiffness

   The moment stiffness is the bending moment at which the output flange is tilted by the tilt angle.

   The tilt angle of the input flange is determined as follows:

$$\varphi_1 = \frac{T_k}{\Theta_1} \quad \text{(Equation C-5)}$$

External bending moment T_k

$$T_k = 10^{-3} \cdot (F_{R2} \cdot \ell_r + F_{A2} \cdot \ell_a) \quad \text{(Equation C-6)}$$

2. Max. permissible bending moment and max. permissible axial load

   Check the external bending moment and the external axial load using equations C-6, C-7 and C-8.

Equivalent bending moment T_{ke}

$$T_{ke} = 10^{-3} \cdot (C_{f2} \cdot B_{f2} \cdot F_{R2} \cdot \ell_r + C_{f2} \cdot B_{f2} \cdot F_{A2} \cdot \ell_a) \; < T_{k\,max} \quad \text{(Equation C-7)}$$

Equivalent axial load F_{A2e} at the output shaft

$$F_{A2e} = F_{A2} \cdot C_{f2} \cdot B_{f2} \; < F_{A2\,max} \quad \text{(Equation C-8)}$$

F_{A2} = output side axial load [N]
$F_{A2\,max}$ = maximum permissible output side axial load [N]
F_{A2e} = equivalent output side axial load [N]
F_{R2} = output side radial load [N]
C_{f2} = correction factor output (Table C-17)
B_{f2} = service factor output (Table C-18)
ℓ_1 = bearing clearance [mm] (Table C-15)
ℓ_r = calculated dimension for bending moment [mm]
ℓ_a = distance of axial load [mm]
x = distance from radial force to flange collar [mm]
a = correction factor [mm] (Table C-15)
T_k = external bending moment [Nm]
$T_{k\,max}$ = max. permissible bending moment [Nm] (Table C-19)
T_{ke} = equivalent bending moment [Nm]
φ_1 = tilt angle [arcmin]
Θ_1 = moment stiffness main bearing [Nm/arcmin] (Table C-16)

Size	Moment stiffness Θ_1
	[Nm/arcmin]
C15	548
C25	1150
C35	2400
C45	2649
C55	3924
C65	5690

Table C-16 Average values for moment stiffness

Correction factor output	C_{f2}
Chain	1
Pinion or rack	1.25
Toothed belt	1.25
V-Belt	1.5

Table C-17 Correction factor output C_{f2}

Service factor output	B_{f2}
Uniform load (no shock)	1
Light impacts	1.2
Severe impacts	1.6

Table C-18 Service factor output B_{f2}

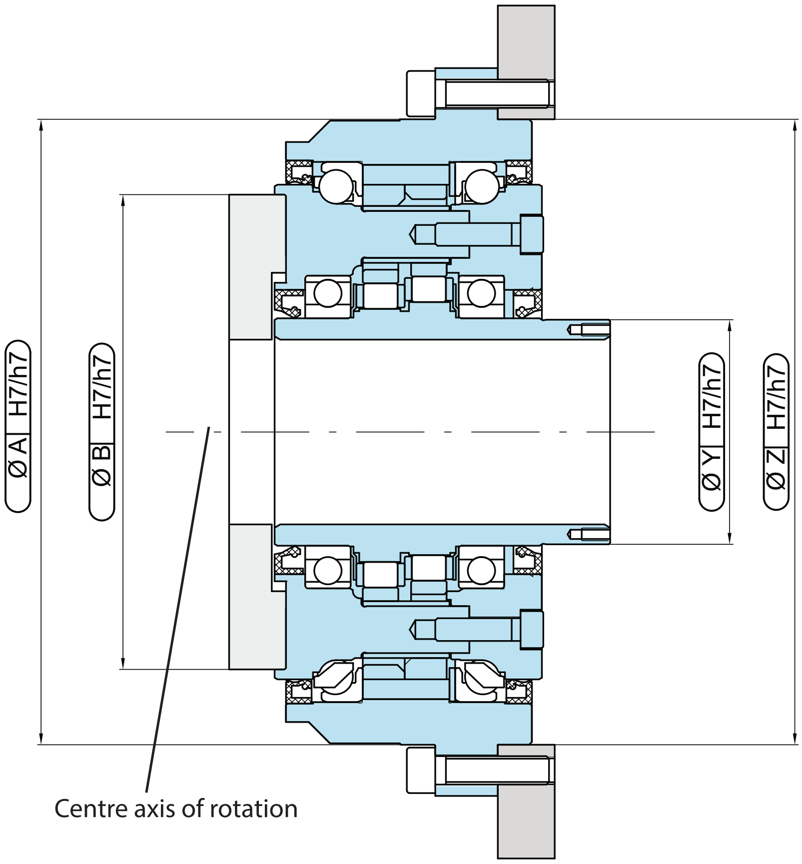
Size	Max. permissible bending moment $T_{k\,max}$	Max. permissible axial load $F_{A2\,max}$
	[Nm]	[N]
C15	1069	3924
C25	1850	7848
C35	2850	10790
C45	3924	8339
C55	6082	10791
C65	8829	13734

Table C-19 Max. permissible bending moment and max. permissible axial load

7.8 Assembly specifications and tolerances

7.8.1 Assembly tolerances

Fittings for assembly of input and output parts (toothed belt, disc, pinion, etc.) are shown schematically in the following figure. Use the diameters and tolerances shown in the table below.

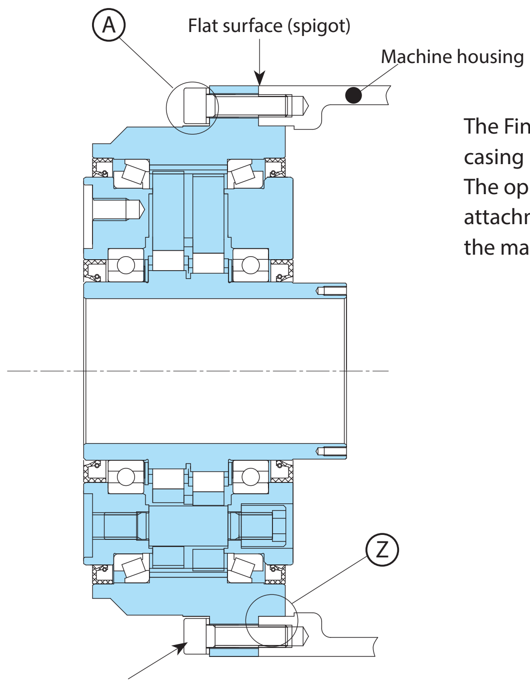


Size	Ø A	Ø B	Ø Z	Ø Y
C15	137	71 h7	137	49.5
C25	185	133 H7	185	59
C35	220	167 H7	220	79
C45	250	192 H7	250	94
C55	284	218 H7	284	109
C65	320	245 H7	320	119

Table C-20 (Dimensions in mm)

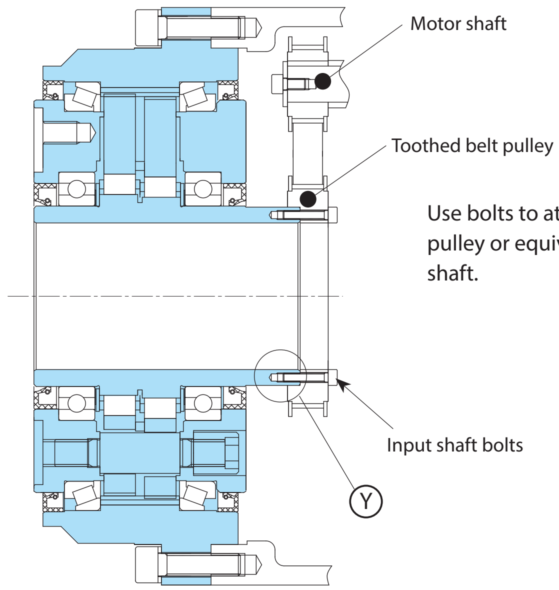
7.8.2 Assembly procedure

(1)



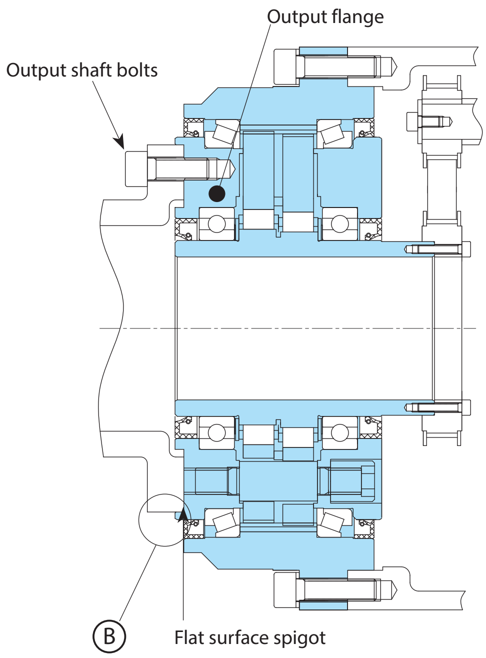
The Fine Cyclo C-Series is attached to the machine casing by bolts. (spigot Z)
The opposite side (spigot A) can also be used for attachment to a machine housing when installed into the machine.

(2)



Use bolts to attach the toothed belt pulley or equivalent parts to the input shaft.

(3)



Use bolts to attach output flange of Fine Cyclo to output shaft of machine.
(spigot B)

Note!
1. Make sure that you use the correct tightening torque for all fastening bolts when attaching the gearbox (see Table C-21).
2. Use bolts that are shorter than the depth of the threaded holes in the dimensioned drawing of the output flange.